



**Operations Monitoring Report  
Fourth Quarter FY08**

**Prepared by:**



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## **I. Executive Summary**

A review of the fiscal year 2008 (FY08) Fourth Quarter performance and contract obligations between Nashville District Energy, LLC (CNDE) and the Metropolitan Government of Nashville and Davidson County (Metro) is presented in this report by Thermal Engineering Group, Inc (TEG). The status of the available funds for all active capital construction and repair and improvement projects are also presented. For FY08, CNDE has satisfactorily met all of the contract obligations to Metro.

For the Fourth Quarter FY08, the chilled water sendout decreased by approximately 6.5% over the previous Fourth Quarter (FY07), and the sales decreased by approximately 7%. The number of cooling degree days decreased substantially over the same periods. The peak chilled water demand for the current quarter is 15,200 tons with a cooling load factor for the quarter of approximately 52%.

The steam sendout is approximately 2% lower this quarter than the previous Fourth Quarter, and steam sales are up by approximately 2%. There were approximately 5.6% fewer heating degree days in the current quarter. Steam system losses were approximately 28% of the sendout which was slightly less than in the previous Fourth Quarter. The peak steam demand for the current quarter is 77,625 pounds per hour, which represents a 3.7% decrease from the previous Fourth Quarter. The heating load factor for the quarter is approximately 36%, which is an increase of approximately 1.7% from the previous Fourth Quarter.

The Energy Generating Facility (EGF) performance continues to surpass the System Performance Guarantee (Guaranteed Maximum Quantity or GMQ) levels. The chilled water and steam plant electric consumptions continue to perform considerably lower than the guaranteed levels. The steam plant fuel efficiency improved approximately 1.6% from the previous Fourth Quarter. The total water consumption for the steam and chilled water plants has decreased approximately 23% from the previous Fourth Quarter due to the extensive repairs to the chilled water and condensate return systems.

Work continued on DES Capital Projects during the Fourth Quarter of FY08. Final modifications to the remaining metering projects (DES 004, 021 & 022) continued during the Fourth Quarter FY08. A review of the operation of the customer steam meters was performed under DES-004. Two FY07 project remain open: DES 036 - 4<sup>th</sup> Ave Vent Fan and DES 041-Symphony Condensate. The DES 036 project has been changed to an R&I project since CNDE has decided to rebuild the existing fan instead of replacing it. Construction is expected to begin in the First Quarter FY09 on this project. Three additional FY08 Capital Project designs were completed and bid during the Fourth Quarter with construction work planned to be complete on two of these projects during the First Quarter FY09. In addition, three more FY08 Capital Projects should complete construction during the First Quarter FY09. One additional FY08 project should be designed and bid during the First Quarter FY09. Repair and Improvements to the EDS continue as scheduled.

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## II. Energy Distribution System Sales and Performance

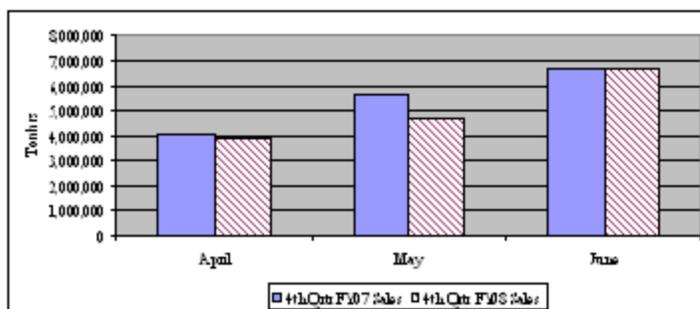
This section of the report discusses and presents performance information regarding the operation of the EGF for the periods described. Charts and tabular data are also presented to provide a more detailed description of the actual EGF performance.

### A. Chilled Water

#### 1. Sales and Sendout

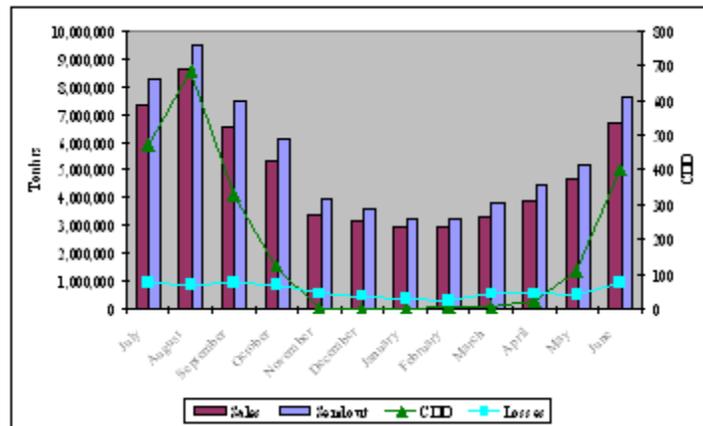
A comparison for the Fourth Quarter chilled water sales is shown in Figure 1. This data reflects a decrease in sales for the current quarter over the same quarter of the previous fiscal year. The decrease in sales may be largely attributed to a decrease in the number of cooling degree days for the quarter.

The peak chilled water demand for the current quarter is 15,200 tons. The cooling load factor for the current quarter, relative to sendout, is approximately 52% and is approximately the same as in the previous Fourth Quarter.



**Figure 1. Fourth Quarter Chilled Water Sales**

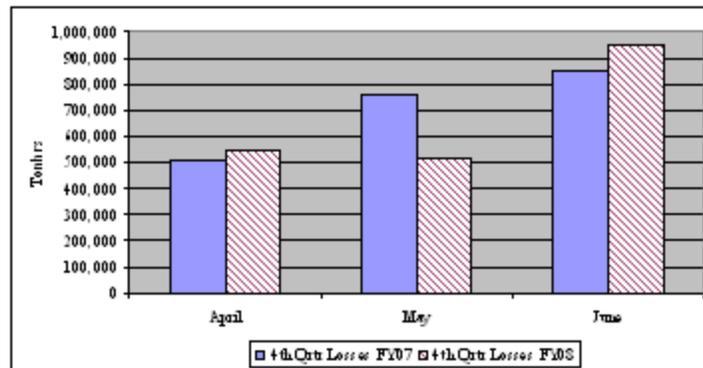
Figure 2 shows the chilled water sales, sendout and losses for the 2008 fiscal year. The losses on this figure are defined as the difference in tonhrs per month between the recorded sendout and sales values and represent the total energy loss for chilled water in the EDS. The number of cooling degree days per month are also tracked for comparison.



**Figure 2. FY08 Chilled Water Sales, Sendout and Losses**

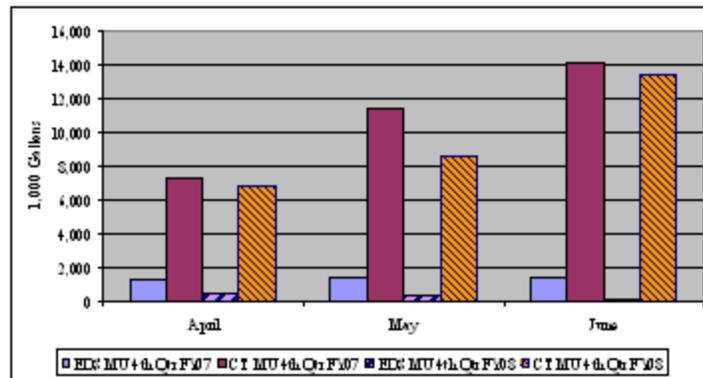
2. Losses

A comparison of the total, chilled water energy losses in the EDS for the Fourth Quarter is shown in Figure 3. These losses are the difference in chilled water sendout and sales. The energy loss is caused by a combination of the loss in the mass of chilled water and a net heat gain into the chilled water piping. The increase in supply temperature between the EGF and the customers is typically less than 1°F.



**Figure 3. Fourth Quarter FY08 Chilled Water Losses**

The mass loss to the EDS is reflected in the amount of city water make-up (MU) to the system. A decrease in the mass loss is noted with a comparison between the Fourth Quarter data for FY07 and FY08. A decrease of approximately 12% in the amount of city water make-up to the cooling towers is also present in the comparison of Fourth Quarter data as shown in Figure 4 and is largely due to a decrease in chilled water sendout.

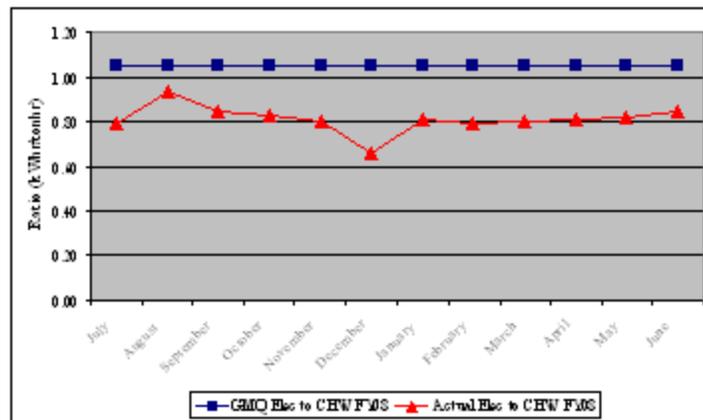


**Figure 4. Fourth Quarter Chiller Plant City Water Make-up**

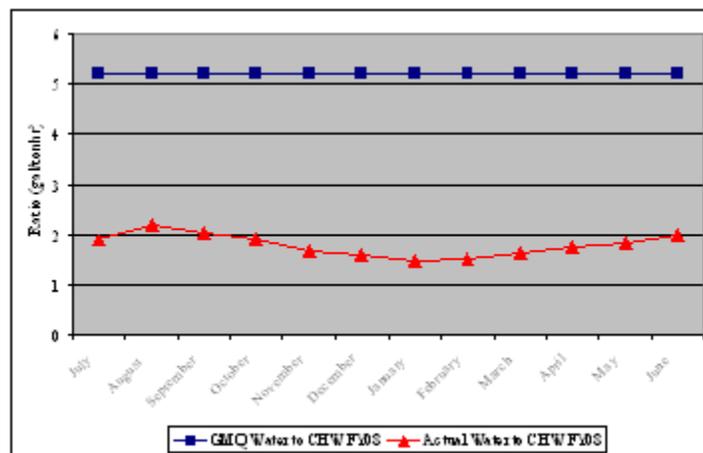
In the operation of a cooling tower, the majority of make-up water required is due to the evaporation of the circulating cooling water. The balance of the make-up is due to the blow down of the tower required by the levels of concentration of particulates and other contaminants entrained in the circulating water. The ratio between the amount of make-up due to evaporation and due to blowdown is referred to as the cycles of concentration. The recorded data for this quarter suggests that the plant operated with an average of 5.6 cycles throughout the quarter and average approximately 5 cycles for the year (FY08). This relatively high level could be indicative of a relatively “clean” condensing water system.

### 3. Performance

The performance of the chilled water aspect of the EGF is presented by the following two charts, Figures 5 and 6, for FY08. Under the management of CNDE, the System Performance Guarantee levels as described in the ARMA are being achieved quite satisfactorily.



**Figure 5. FY08 Chilled Water Plant Electric Performance Guarantee Comparison**



**Figure 6. FY08 Chilled Water Plant Water Consumption Performance Guarantee Comparison**

The chilled water allocation of the electric consumption falls under the GMQ limit of 1.055 kWhr per tonhr for the current quarter, and no excursion is reported for the fiscal year. The electric usage for the current quarter decreased slightly over the Fourth Quarter for FY07. The annual usage for FY08 is approximately 1.8% less than that for the total year of FY07. Also, the actual chilled water plant water conversion factor is approximately 13.5% less than in the Fourth Quarter of FY07. The annual consumption of city water for the chiller plant for FY08 is approximately 5% less than that for the total year of FY07.

B. Steam

1. Sales and Sendout

The steam sendout decreased by approximately 2% for the current quarter over the previous Fourth Quarter (FY07), and the sales increased by approximately 2%. Steam system losses decreased approximately 11%. There were approximately 5.6% fewer heating degree days this quarter. A comparison for the Fourth Quarter steam sales is shown in Figure 7.

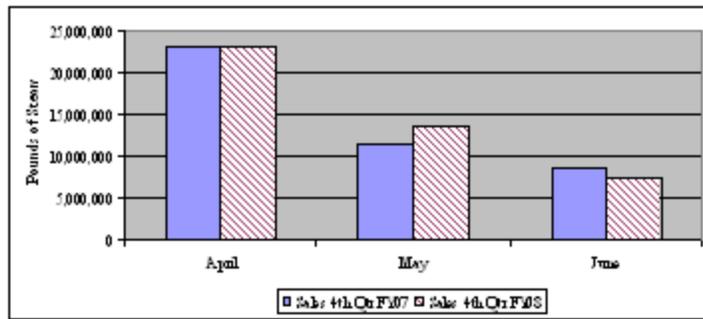


Figure 7. Fourth Quarter Steam Sales Comparison

Figure 8 shows the steam sales, sendout and losses for the fiscal year (FY08). The losses on this figure are defined as the difference in pounds per month between the recorded sendout and sales values and represent the total mass loss in the EDS between the EGF and the customer meters.

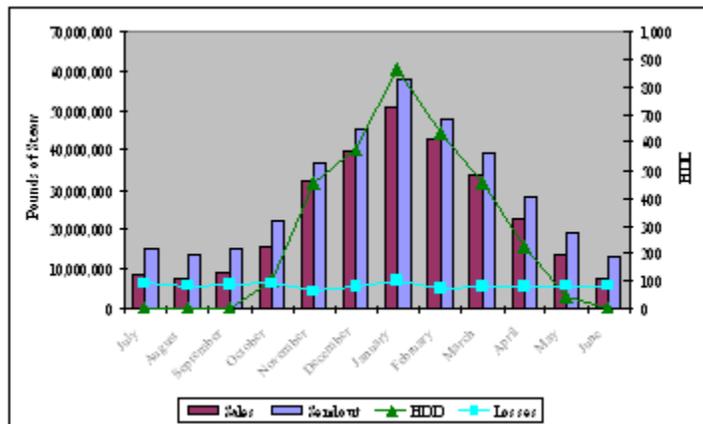
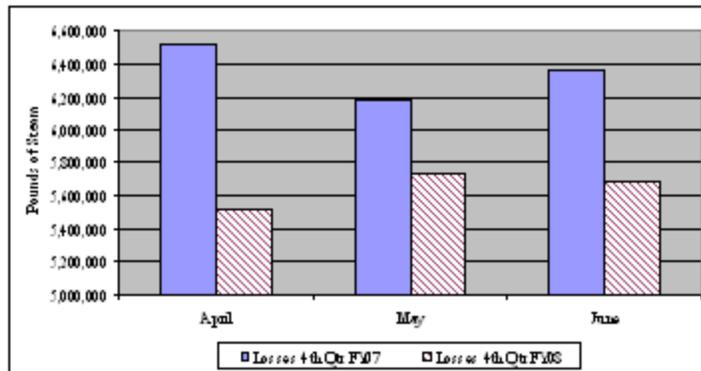


Figure 8. FY08 Steam Sales, Sendout and Losses

The peak steam demand for the current quarter is 77,625 pounds per hour, which was approximately 3.6% less than the peak demand for the previous Fourth Quarter. The heating load factor for the current quarter, relative to sendout, is approximately 36%.

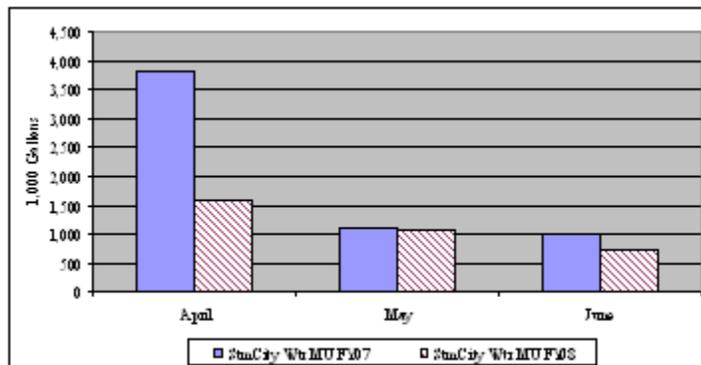
## 2. Losses

A comparison of the total steam mass losses in the EDS for the Fourth Quarter is shown in Figure 9. The mass loss is caused by the heat loss in the EDS between the EGF and the customer meters, resulting in a mass loss at steam traps. Faulty traps, steam leaks or meter error could also be a contributing cause of these losses. The total losses for the current quarter are approximately 11% less than in FY07.



**Figure 9. Fourth Quarter Steam Losses**

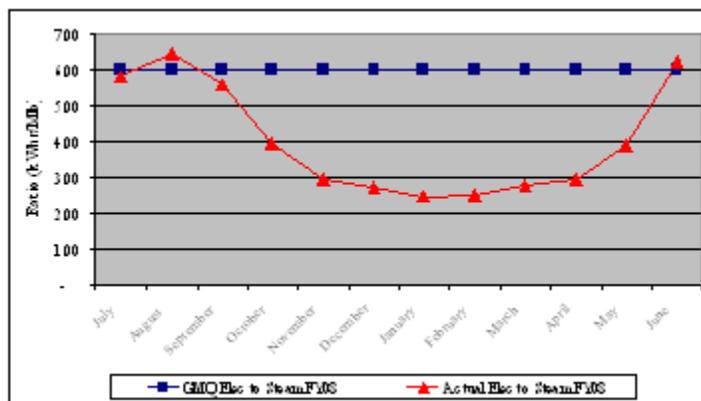
The amount of city water make-up (MU) to the steam system consists of the loss in mass between the EGF and the customers, in the condensate return from the customers to the EGF and losses at the EGF. This data is shown in the comparison of Third Quarter data in Figure 10.



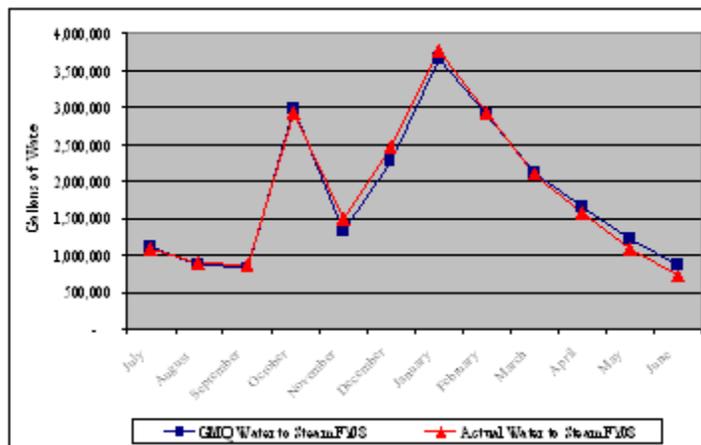
**Figure 10. Fourth Quarter Steam System City Water Make-up**

### 3. Performance

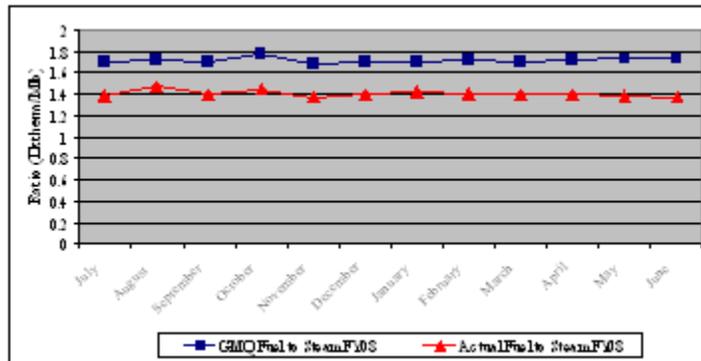
The performance of the steam system aspect of the EGF is presented by the following three charts, Figures 11, 12 and 13. Under the management of CNDE, the System Performance Guarantee levels as described in the ARMA are being achieved satisfactorily except for excursions in the water consumptions throughout the fiscal year. The fuel consumptions remain below the GMQ for the quarter and the year. The electric usage for the current quarter is slightly less than in the Fourth Quarter for FY07.



**Figure 11. FY08 Steam Plant Electrical Performance Guarantee Comparison**



**Figure 12. FY08 Steam Plant Water Consumption Performance Guarantee Comparison**



**Figure 13. FY08 Steam Plant Fuel Consumption Performance Guarantee Comparison**

C. Contract Guarantee Performance

The production and sales performance for the EGF and EDS are summarized in Table 1. Additional parameters, such as cooling tower blowdown and peak demands are listed in this table, as well. Table 2 presents the Fourth Quarter comparison of the Guaranteed Maximum Quantities (GMQ) of the criteria commodities (fuel, water and electricity).

**Table 1. FY08 Production, Sales and Consumption Summary**

	Unit	Fourth Quarter FY08	Fourth Quarter FY07	%Percent Difference	Total Year FY08	Total Year FY07	%Percent Difference
	days	91	91	0.00%	366	365	0.27%
<b>Total Electric Use</b>	kWhrs	12,773,117	13,739,053	-7.17%	49,646,058	52,122,731	-4.99%
Chilled Water	kWhrs	12,605,432	13,392,110	-7.26%	48,736,023	51,182,726	-5.02%
Steam	kWhrs	167,685	166,943	0.44%	910,035	940,005	-3.29%
<b>Total Water Use</b>	gal	33,124	42,836	-22.67%	138,399	177,177	-27.83%
Total Chilled Water	gal	29,774	36,915	-19.34%	116,961	126,910	-8.51%
EDS Make-up	gal	881	4,113	-78.58%	6,372	12,942	-103.11%
Cooling Towers	gal	28,893	32,802	-11.92%	110,589	113,968	-3.06%
Calc. CT Evaporation	gal	24,540	NA	NA	92,182	NA	NA
CT Blowdown	gal	4,353	NA	NA	18,407	NA	NA
Calc # Cycles		5.64	NA	NA	5.01	NA	NA
Steam	gal	3,330	5,921	-43.42%	21,638	30,267	-132.30%
<b>Total Fuel Use</b>	mmBTU	84,553	87,767	-3.66%	497,244	570,146	-14.66%
Natural Gas	mmBTU	84,537	87,767	-3.68%	496,541	569,952	-14.78%
Propane	mmBTU	16	0	N/A	703	194	72.40%
<b>Condensate Return</b>	gal	4,243	1,935	119.34%	24,557	1,951	92.06%
	lb	34,607,718	15,778,308	119.34%	200,285,655	15,910,370	92.06%
Avg Temp	°F	167.0	173.0	-3.47%	170.0	159.7	6.08%
<b>Sendout</b>							
Chilled Water	tonhrs	17,254,400	18,468,700	-6.57%	66,555,900	68,604,100	-3.08%
Steam	lb	61,013,000	62,256,000	-2.00%	354,674,000	392,839,000	-10.76%
Peak CHW Demand	tons	15,200	16,251	-6.47%	17,400	17,300	0.57%
Peak Steam Demand	lb/hr	77,625	80,563	-3.65%	122,531	122,290	0.23%
CHWLF		51.98%	52.04%	-0.12%	43.53%	45.27%	-3.96%
Steam LF		35.99%	35.38%	1.71%	32.95%	36.68%	-11.32%
<b>Sales</b>							
Chilled Water	tonhrs	15,241,424	16,355,933	-6.81%	58,857,190	60,720,304	-3.17%
Steam	lb	44,079,733	43,183,394	2.08%	285,066,506	322,648,238	-13.18%
<b>Losses</b>							
Chilled Water	tonhrs	2,012,976	2,112,767	-4.72%	7,698,710	7,883,796	-2.40%
Steam	lb	16,933,267	19,072,606	-11.22%	69,607,494	70,190,742	-0.84%
		27.75%	30.64%	-9.41%			
<b>Degree Days</b>							
CDD		535	638	-18.69%	2,154	2,026	5.94%
HDD		270	286	-5.59%	3,346	3,241	3.14%

\*positive percent difference values imply an increase from FY07 to FY08

**Table 2. FY08 Performance Guarantee for Steam and Chilled Water**

GMQ Calculations	Unit	Fourth Quarter FY08	Fourth Quarter FY07	%Percent Difference	Total Year FY08	Total Year FY07	%Percent Difference
<b>Steam</b>							
GMQ Elec Conversion	kWhr/Mb	6.00	6.00		6.00	6.00	
Electric Conversion	kWhr/Mb	3.80	3.87	-1.60%	3.19	2.91	8.74%
GMQ Heat Efficiency	Dth/Mb	1.726	1.746		1.721	1.772	
Heat Efficiency	Dth/Mb	1.386	1.410	-1.70%	1.402	1.451	-3.52%
Actual %CR		56.72%	25.34%	123.81%	56.47%	4.05%	92.83%
Avg CR Temp	°F	167	173	-3.47%	170	160	6.08%
GMQ Water Conversion	gal	3,723,226	6,553,498		21,769,233	53,148,099	
Water Conversion	gal	3,383,500	5,980,210	-43.42%	21,854,814	30,769,670	-132.30%
<b>Chilled Water</b>							
GMQ Elec Conversion	kWhr/tonhr	1.055	1.055		1.055	1.055	
Electric Conversion	kWhr/tonhr	0.827	0.831	-0.48%	0.828	0.843	-1.80%
GMQ Water Conversion	gal/tonhr	5.25	5.25		5.25	5.25	
Water Conversion	gal/tonhr	1.95	2.26	-13.45%	1.99	2.09	-5.18%

\*positive percent difference values imply an increase from FY07 to FY08

#### D. Operating Costs

The operating costs for the DES are comprised of the fixed and variable costs. The fixed costs are those expenditures that do not vary depending on the amount of steam or chilled water produced or sold to the customers. These costs include the management fee to CNDE, debt service payments on the bonds and engineering and administration costs. The variable costs are dependent on the amounts of steam and chilled water produced and sold to the customers. These costs include the utility and chemical treatment costs. The vast majority of the costs incurred for the operation of the DES are passed onto the customers in the form of the demand charges (fixed costs) and energy charges (variable costs). A summary of the total operating costs for FY08 are shown in Table 3.

The revenues shown reflect the charges and payments to the customers for their respective steam and chilled water service. The difference between the total costs and revenues from the customers is the shortfall that must be paid by Metro. The shortfall exists, in part, due to the remaining capacity at the EGF that was included in the original construction and remains unsold. This capacity is available for potential future customers.

For FY08, the total operating costs were \$20,028,072 which is a 4% reduction in the operating costs from FY07. The customer revenues also decreased from FY07 to FY08 by 6% to \$17,460,180. This decrease in costs and revenues resulted in a net increase in the Metro Funding Amount (shortfall) by 14% to \$2,567,892 (post True-up). The total operating costs and customer revenues were each under budget by approximately 13%, resulting in an MFA that was approximately 7% over budget.

**Table 3. FY08 Operating Cost Summary**

Item	FY08 Budget	FY08 Pre-True up	Percent Difference
* FOC: Basic	\$ 3,739,971	\$ 3,739,971	0.00%
* FOC: 9th Chiller	\$ 35,044	\$ 35,044	0.00%
* FOC: Change Order 6A	\$ 69,187	\$ 69,187	0.00%
* FOC: Change Order 6B	\$ 80,571	\$ 80,571	0.00%
Chemicals	\$ 156,500	\$ 187,192	19.61%
Engineering	\$ 55,401	\$ 21,160	-61.81%
Insurance	\$ 41,200	\$ 29,850	-27.55%
Marketing: CEPS Sales Activity	\$ 27,000	\$ -	-100.00%
Metro Marketing	\$ 53,730	\$ 27,801	-48.26%
Incentive Payments	\$ 29,200	\$ 33,027	13.10%
Project Administration	\$ 25,640	\$ -	-100.00%
Metro Incremental Cost	\$ 617,560	\$ 539,148	-12.70%
Water/Sewer	\$ 681,640	\$ 538,927	-20.94%
Natural Gas/Propane	\$ 7,099,510	\$ 4,957,819	-30.17%
Electricity	\$ 4,693,460	\$ 4,204,886	-10.41%
* EDS Repair & Improvement	\$ 166,435	\$ 161,709	-2.84%
* EDS Surcharge	\$ 66,463	\$ 10,805	-83.74%
<b>* Sub-total Operations</b>	<b>\$ 17,618,512</b>	<b>\$ 14,617,097</b>	<b>-17.04%</b>
2002 Bonds	\$ 4,297,569	\$ 4,362,377	1.51%
2005 Bonds	\$ 629,838	\$ 629,837	0.00%
FY07 Projects	\$ 227,769	\$ 227,800	0.01%
FY08 Projects	\$ -		n.a.
Debt Service Interest Revenue	\$ -		n.a.
Oper. Reserve Funding Deposit	\$ 191,460	\$ 190,961	-0.26%
<b>* Sub-total Debt Service</b>	<b>\$ 5,346,635</b>	<b>\$ 5,410,975</b>	<b>1.20%</b>
<i>* Overstatement of FOC's</i>	<i>\$ 30,243</i>		
<b>* Total Expenses</b>	<b>\$ 22,995,390</b>	<b>\$ 20,028,072</b>	<b>-12.90%</b>
<b>Customer Revenues</b>	<b>\$ 20,561,192</b>	<b>\$ 17,953,792</b>	<b>-12.68%</b>
<b>Project Admin. Revenue</b>	<b>\$ 25,640</b>		
<b>True up Credits to Customers</b>		<b>\$ (493,613)</b>	
<b>Total Metro Funding Amount</b>	<b>\$ 2,408,558</b>	<b>\$ 2,567,892</b>	<b>6.62%</b>

*\* Note: FY08 Budget used the 3% Escalator for the final budget instead of the 2.2% overstating Budgeted Total FOC's by \$30,243 i.e. \$22,995,400.*

The DES serves 27 customers and 40 buildings in downtown Nashville. These customers are divided into three categories: 1) Private customers who privately own their buildings, 2) State of TN owned buildings and 3) Metro owned buildings. A summary of the annual costs for each of these three categories is presented in Table 4. These values include \$13,453 collected due to late fees and penalties.

**Table 4. FY08 Customer Revenues**

Annual Revenue FY08 (post True-up)						
Building	Chilled Water			Steam		
	Total Cost	Consumption (tonhrs/yr)	Unit Cost (\$/tonhr)	Total Cost	Consumption (MMB/yr)	Unit Cost (\$/MMB)
Private Customers	\$ 3,761,441	218,149.50	\$ 0.1724	\$ 2,243,317	87,525	\$ 25.631
State Government	\$ 3,094,627	178,710.80	\$ 0.1732	\$ 2,813,224	101,678	\$ 27.668
Metro Government	\$ 2,941,185	188,681.60	\$ 0.1559	\$ 2,592,933	95,558	\$ 27.135
New Customers	\$ 1,276,101	73,251.38	\$ 0.1742	\$ 519,595	23,319	\$ 22.282
<b>Total</b>	<b>\$ 9,797,253</b>	<b>585,541.90</b>	<b>\$ 0.1673</b>	<b>\$ 7,649,474</b>	<b>284,761</b>	<b>\$ 26.863</b>

pre True-up Revenue	\$	17,953,792
True-up Amount	\$	(493,613)
Late Fees & Penalties	\$	13,453
post True-up Revenue	\$	17,460,179

### III. EGF Operations

Items relating to the facility operations presented herein are derived from the reports issued by CNDE for the months of April, May and June 2008. Communication between TEG and CNDE continues to be excellent, and CNDE has reported and managed all EGF operations satisfactorily and according to agreement.

#### A. Reliability

The principle issues surrounding the reliable operation of the EGF relates to the ability to operate without significant interruption, exclusive of planned outages, and disruption of service to the customers. CNDE reported several disruptions in service during the quarter, but the duration of each was short and had negligible apparent effects on the customers. The reliability issues are summarized in this section.

- An apparently faulty boiler safety relief valve lifted on April 3 and 8 causing the steam sendout pressure to drop. The boiler was placed offline and the valve was replaced.
- A condensate return pump failure in MH 18 caused a decrease in the amount of condensate return on April 20. The pump was repaired.
- At 1:10 pm on May 10, the EDS experienced a drop in chilled water pressure. Upon investigation, CEPS determined that personnel at the James K Polk building had completed repairs to their building, which required a draining of their in-building system, and were using the EDS chilled water to re-fill their system. This excursion in pressure caused an increase in chilled water temperature above 43°F for approximately 40 minutes.
- Due to an NES lightning arrester failure, several power interruptions were experienced at the EGF on May 23. These power interruptions caused the operating equipment to trip and required a re-start of both the chiller and boiler plants. The power outages lasted less than 30 minutes.

B. Efficiency

The operation of the EGF satisfied the guaranteed levels for all commodity usage during the quarter. The steam plant water and electric usages exceeded their guaranteed values on a few occasions during the fiscal year. A more detailed discussion of the contract guarantee performance was presented previously in this report.

C. Environment, Health and Safety

No environmental violations were reported during the quarter. There were no employees reported to be on light duty and were no reported lost-time accidents during the quarter. Monthly safety meetings were conducted by HazMat, Inc., the Nashville Fire Department and others.

There was only one reportable safety incident during the fiscal year. A CEPS employee came in contact with sodium bisulfite residue, resulting in dermatitis. The employee sought medical attention and returned to work. This incident did not result in any lost time.

D. Personnel

The EGF currently has twenty-six full time employees. There were no personnel changes during the quarter.

E. Training

Staff training for this quarter consisted of the Health and Safety training discussed previously.

F. Water Treatment

The water treatment program consists of regular testing and monitoring of the water chemistry in the steam, chilled water and condensing water systems. Chemicals are added to control the water hardness, chlorine levels and biologicals. Remote testing of the condensate at the AA Birch, Tennessee Tower and the Andrew Jackson also occurs regularly to monitor the concentration and distribution of the steam system chemicals.

- Steam System
  - A dissolved oxygen study was performed by Chemtreat, Inc. (The water treatment vendor for the EGF and EDS) in April. The results of this study indicated that the operation of the de-aerators were acceptable and no adjustments to the operation were made.

- Fluctuations in the chlorine concentrations in the boiler plant make-up occurred during the quarter, but the sulfite injection system recently installed was capable of controlling the chlorine concentrations to acceptable levels.
- The feedwater to the boilers continues to show trace levels of hardness.
- The remote testing of the condensate at the customer buildings indicates fluctuating levels of iron at the Andrew Jackson building (State steam tunnel).
- Condensing Water System
  - The conductivity of the condensing water continues to be normal with only a few excursions resulting in high cycles of concentration and low blowdown rates.
- Chilled Water System
  - The system control and chemistry continues to be excellent.
  - The previously reported azole excursions have returned to normal during the quarter.

#### G. Maintenance and EGF Repairs

CNDE continues to report on the numerous routine maintenance and preventive maintenance activities performed on the EGF primary and ancillary equipment. The principle items are discussed herein as they relate to the repair, maintenance or replacement of equipment or devices at the facility and are not considered extraordinary.

- Boilers #1 and #3 were inspected.
- The conductivity probe on boiler #3 was replaced.
- The cooling tower fan belt drives on cells 5, 7, 8 and 10 were replaced.
- Other minor repairs and maintenance were made during the quarter and are listed in the monthly reports issued by CEPS

#### H. EGF Walk-through

A quarterly Walk-through of the EGF was performed on June 24, 2008, by Kevin Jacobs, P.E. This review involved a tour of the facility with the primary points of interest and concern noted herein.

- The caution tape and safety padding on the cooling tower support beams at the south end of the cooling tower bay are missing or deteriorating.
- Numerous minor cracks in the outside concrete walls remain. No additional work has been performed on these cracks. No action is required at this time.

- The re-grading and sloping of the area at the west face of the EGF has not been completed. These repairs could help prevent further settling of the foundation and soil erosion. No action is required at this time.
- Empty boxes and paint are being stored in the electrical room.
- De-aerator #1 was shut down and the head was opened during the walkthrough. The internals appeared structurally sound.
- Boilers #1 and #3 were shut down and the refractory removed from the rear for inspection.

#### **IV. Capital Projects**

The Capital Projects discussed in this section are those projects funded through the issuance of bonds by Metro. The status of scheduling of the projects are discussed, and the project cost-to-date and bond balance are also presented.

##### **A. Fourth Quarter FY08 Open Projects**

The following projects remained open at the end of the Fourth Quarter of FY08.

##### **1. DES004 & 021 - Customer Metering (State and Metro Owned)**

A review of the applicability and accuracy of the state steam meters occurred during the Fourth Quarter. This initial review warranted a more thorough review of the appropriateness of the sizing of all customer steam meters due to some observed issues with the recorded data. A report was subsequently issued stating, in summary, that all steam meters are appropriately sized but that some meters may need a software upgrade to improve the accuracy of the recorded data during periods of low steam flow.

##### **2. DES022 - Customer Metering (Privately Owned)**

Additional work was required at the Wildhorse Saloon and Ryman Auditorium. Work at the Sheraton Hotel relating to the control and operation of their de-coupled system was completed during the Fourth Quarter.

##### **3. DES033 - Manhole Lid and Ring Replacement/Restoration**

This project relates to the repair and replacement of manhole lids and rings whenever Metro Public Works performs street re-paving. A small amount of work was reported for this project during the Fourth Quarter FY08. This project will remain open.

#### 4. DES041 - Symphony Condensate Repair

The Symphony's condensate is currently being tempered with city water and discharged to the sewer system via Manhole B4. Prior to this condensate being tempered, it was reported to have damaged some sewer piping near Manhole B4 at its discharge point. TEG completed a preliminary evaluation of the options available for disposal or recovery of the condensate. Based on the recovery of condensate from the Symphony and from the driplegs located in the three manholes along the route, combined with the potential damage which may occur to manhole structures due to the collection of condensate within vaults, a suitable payback exists to install a condensate return line from Manhole B4 to Manhole B. This new line will enable the recovery of the condensate from the Symphony and will also provide a means of recovery of condensate from the planned convention center.

The design of this condensate line was completed and issued for bid during the Fourth Quarter FY08. Bids are due early in the First Quarter FY09 and will be reviewed, evaluated, compared to construction estimates and update the payback analysis. The outcome of this process will dictate whether a contract is issued for the construction.

#### 5. DES042 - Regions Bank Condensate Line Repair

Due to a previous failure, the condensate line between Manholes 3 and 4 was isolated, and the condensate from the steam traps in MH 4 was piped into the Regions Bank building where it was drained to the sewer. The condensate line into the Regions Bank has collapsed and is in need of replacement. Economic evaluations were performed regarding the repair of the condensate line between MH 3 and 4 to return the condensate to the EGF, however, a favorable payback did not exist. Hence, the service line to the Regions Bank building must be replaced in order to drain the condensate from the dripleg in MH 4.

Work began on this project during the Fourth Quarter FY08. Some additions to the scope were made which included running vent piping from the Regions Bank basement to Manhole 4 along with the inclusion of a separate water meter for the tempering water which will be billed directly to NDES.

This project should be completed early in the First Quarter FY09.

#### 6. DES044 - MH 5 to MH 9 Condensate Line Replacement

The condensate line between Manholes 5 and 9, located along 5<sup>th</sup> Avenue between Deaderick and Union Streets, has been isolated due to its poor condition. This

segment of condensate line represents a portion of the “main condensate loop” within the downtown distribution system. The replacement of this section of the condensate return system will provide redundancy to enable the return of condensate to the plant from two directions, thus improving the reliability of the system.

As a result of additional research, the scope of this project may need to also include the repair or replacement of portions of the steam piping along this route. Therefore, the design for this project is currently on hold pending re-evaluation of the project’s scope. Funding has been requested in the FY09 capital budget to cover costs relating to the potential for steam line replacement.

7. DES045 - MH 6 to MH 23 Condensate Line Replacement and the Sheraton Hotel Condensate Service Line Replacement

Thermographic imaging of the condensate line between Manholes 6 and 23, located along Union Street between 6<sup>th</sup> and 7<sup>th</sup> Avenues, indicates that the line has potential leaks. This section of the condensate main receives condensate only from the Hermitage Hotel. With the condensate line between MH 5 and 9 out of service, the condensate return from the 501 Building would also be lost if the section of line between MH 6 and MH 23 were to go out of service. Because the thermographic survey only indicates one or two potential problem spots, in an attempt to avoid the replacement of all 400 feet of piping, design has been completed to perform a repair to a portion of this line and to perform inspections to determine the extensiveness of deterioration.

This repair was bid and awarded during the Fourth Quarter FY08 with construction expected to begin early in the First Quarter FY09. If it is determined that damage to this line is extensive, then additional design will need to take place and, in all probability, the entire 400 feet will need to be replaced.

8. DES046 - Ryman Auditorium Condensate Line

The condensate service line from the Ryman Auditorium to the main return line in 4<sup>th</sup> Avenue is in very poor condition and has been isolated. Due to this isolation, the condensate is currently being tempered with city water inside the Ryman Auditorium and then discharged to the Ryman’s sewer system. As described in prior quarterly reports, it was believed that due to the length of this service line, the return on the capital cost replacement was inadequate. Therefore, the preferred solution was to install a tempering station at the customer’s building to cool the condensate for disposal into the city sewer system. Based upon recently received bids on other DES projects, an adequate capital return might exist for the replacement of the condensate

pipng. Additionally, the Ryman representative's response to the installation of a tempering station within the Ryman was not well received.

TEG intends to develop a design for the replacement of the existing condensate piping and receive bids for this work. Upon the receipt of these bids, TEG will re-evaluate the most viable option.

9. DES047 - State Steam Tunnel Condensate Line Replacement

An award for the replacement of approximately 400 feet of 2 inch condensate piping along with the replacement of eight (8) slip type expansion joints was awarded and commenced during the Fourth Quarter FY08. This work was very close to completion by the end of the Fourth Quarter and will be completed early in the First Quarter FY09.

10. DES048 - Tunnel Lighting & Electrical Upgrades Phase III

The lighting and some of the electrical system located in the Broadway, 4<sup>th</sup> Avenue and 7<sup>th</sup> Avenue distribution tunnels was in poor condition and presented a potential safety hazard to maintenance personnel. Therefore, a plan was developed to repair and replace the lighting and some electrical components in three phases over a three year period. The first two phases of this project have been completed and the final phase is budgeted and scheduled to be replaced during this fiscal year. However, the sections of the tunnel system which this third phase addresses has experienced some structural degradation. Therefore, CNDE is currently evaluating the structural aspects of these tunnel sections through a third-party contractor. Once repairs to these tunnel sections are made, this third phase of the lighting and electrical upgrades will proceed.

11. DES049 - Temporary Boiler Connection

Through the City of Nashville's evaluation of emergency planning, it was determined that there is a need to be able to supply heating to the inmates housed in the Metro Criminal Justice Center and Courthouses should the EDS steam system be out of service. This project includes the installation of emergency connections in an existing manhole to allow a temporary boiler to be connected to the northeastern section of the distribution system.

The design and bidding of this project was completed during the Fourth Quarter FY08 with construction beginning late in the quarter. The construction for project should be complete early in the First Quarter FY09.

12. DES050 - Manhole & Tunnel Insulation Repair

Insulation in several of the manholes and some portions of the tunnels is in disrepair. Not only does this present a safety hazard to personnel, but it can also cause damage to manhole equipment, components and the manhole structure. The required work within these manholes has been prioritized, and a standard insulation specification has been completed. The receipt of bids for the repair and replacement of insulation in the higher priority manholes began during the Third Quarter FY08 with the award of three manholes.

Manhole U has also been addressed under this project. Work at this manhole commenced during the Second Quarter to address high heat and associated pavement damage. The unexpected excavation of piping outside of the manhole was required on this vault in order to remedy these problems. Work involved with this manhole was completed during the Fourth Quarter FY08.

The replacement/repair of insulation in three other high priority manholes was awarded during the Third Quarter FY08 (Manholes B, M and 10). This insulation repair/replacement should take place during the First Quarter FY09.

The work associated with this project will be ongoing as required.

13. DES051 - Expansion Joint Replacement - 4<sup>th</sup> Ave Tunnel

It has been determined that this project qualifies as a Repair & Improvement project and not a capital project. Therefore it has been moved to the R&I category.

14. DES052 - Wildhorse Saloon Steam & Condensate Line Replacement

The condensate service line to the Wildhorse Saloon failed during FY07. In addition, CNDE has been monitoring a “hot spot” on the steam service line for several months. After a review of the condition and type of piping system serving this customer, it is anticipated that the steam line may also require replacement in the future. TEG completed the design for these modifications and bids were solicited for this project during the Second Quarter FY08. Bids were received early in the First Quarter FY08 for replacing only the condensate line, however, the pricing was prohibitive for the project to move forward. Therefore, as a temporary solution, a tempering station has been designed to cool the condensate and dispose of the effluent to the sewer system. Meetings with the customer have taken place, and they are receptive to this approach. This tempering system design will be issued for bid early in the First Quarter FY09, and it is anticipated that the construction would be started and completed during the same quarter.

B. Fourth Quarter FY08 Closed Projects

There were no projects closed during the Fourth Quarter FY08.

C. Capital Projects Budget

The following table summarizes the costs and remaining balance of the DES capital projects based on reported expenditures at the end of the Fourth Quarter FY08. Open projects or completed projects that require some additional management are shown. Projects that were closed to date are shown with a gray highlight. The total, historic budget and expenditures of the 2002A Bond are not shown; the values shown only reflect the more recent projects and expenditures with the remaining project balance.

**Table 5. FY08 Capital Project and Bond Summary**

DES Project #	Description	Total Budget	Total Spent to Date	Remaining Balance
<b>2002A Bond Projects</b>				
DES017	TN Tower Decoupling	\$ 1,350,422.00	\$ 1,308,756.62	\$ 41,665.38
	Interest Earned	\$ -	\$ (5,370.18)	\$ 5,370.18
	<b>Total Closed Projects</b>	<b>\$ 2,377,280.59</b>	<b>\$ 2,377,280.59</b>	<b>\$ -</b>
	<b>Total 2002A Bond</b>	<b>\$ 3,727,702.59</b>	<b>\$ 3,680,667.03</b>	<b>\$ 47,035.56</b>
<b>2005B Bond Projects</b>				
DES020	Renaissance Decoupling	\$ 538,818.00	\$ 593,478.75	\$ (54,660.75)
DES004,021,022	Customer Metering	\$ 1,676,439.40	\$ 1,861,120.64	\$ (184,681.24)
DES042	Regions Cond Line Replacement	\$ 320,000.00	\$ 25,517.60	\$ 294,482.40
DES018	Library Connection	\$ 767,151.00	\$ 767,027.83	\$ 123.17
DES019	Symphony Connection	\$ 2,470,924.00	\$ 2,491,252.52	\$ (20,328.52)
DES027	Viridian Connection	\$ 1,546,969.00	\$ 1,601,378.95	\$ (54,409.95)
	Project Development	\$ 866,198.60	\$ 315,570.26	\$ 550,628.34
	<b>Total 2005B Bond</b>	<b>\$ 8,166,500.00</b>	<b>\$ 7,655,346.55</b>	<b>\$ 531,153.45</b>
<b>2007 Bond Projects</b>				
DES024B	MH 18 to L Steam/Cond	\$ 818,206.00	\$ 997,287.62	\$ (179,081.62)
DES029	Tn Tower Cond Line	\$ 317,031.00	\$ 339,029.99	\$ (21,998.99)
DES035	MH 5 ot MH 6 Cond Line	\$ 489,688.00	\$ 491,402.54	\$ (1,714.54)
DES037	JK Polk Cond Line	\$ 413,123.00	\$ 456,217.87	\$ (43,094.87)
DES040	Tunnel Lighting Ph II	\$ 152,551.00	\$ 153,074.50	\$ (523.50)
DES034	State Tunnel Communications	\$ 20,500.00	\$ 20,509.00	\$ (9.00)
DES038	Wachovia Cond Line	\$ 83,016.00	\$ 83,016.00	\$ -
DES039	2" State Cond Line	\$ 80,233.00	\$ 80,233.01	\$ (0.01)
	Project Development	\$ 484,152.00	\$ -	\$ 484,152.00
	<b>Total 2007 Bond</b>	<b>\$ 2,858,500.00</b>	<b>\$ 2,620,770.53</b>	<b>\$ 237,729.47</b>
<b>2008 Bond Projects</b>				
DES044	MH 5 to MH 9 Cond Line	\$ 550,000.00	\$ 9,211.56	\$ 540,788.44
DES045	MH 6 to MH 23 & Sheraton CND Lines	\$ 700,000.00	\$ 19,271.48	\$ 680,728.52
DES046	Ryman Auditorium Cond Line	\$ 150,000.00	\$ 4,205.58	\$ 145,794.42
DES047	State Steam Tunnel	\$ 325,000.00	\$ 7,558.53	\$ 317,441.47
DES048	Tunnel Lighting & Elec Ph III	\$ 90,000.00	\$ -	\$ 90,000.00
DES049	Temp Boiler Connection MH 15	\$ 93,500.00	\$ 6,779.70	\$ 86,720.30
DES050	MH & Tunnel Insul Repair	\$ 100,000.00	\$ 6,079.60	\$ 93,920.40
DES051	Exp Jt Replacement 4th Ave At MH 17	\$ 220,000.00	\$ 596.28	\$ 219,403.72
DES052	Wildhorse Stm & Cond	\$ 130,000.00	\$ 34,043.26	\$ 95,956.74
DES053	Tunnel Mapping	\$ 37,606.80	\$ 11.67	\$ 37,595.13
	Closed Projects Sub-total	\$ -	\$ -	\$ -
	Metro Project Admin	\$ -	\$ -	\$ -
	Project Man, Development, etc	\$ 352,393.20	\$ -	\$ 352,393.20
	<b>Total 2008 Bond</b>	<b>\$ 2,748,500.00</b>	<b>\$ 87,757.68</b>	<b>\$ 2,660,742.32</b>

## V. Energy Distribution System Repairs, Improvements, PM and Emergencies

Several EDS repairs and improvements were made during the Fourth Quarter. The principle items for discussion are presented in the following sections.

### A. Repairs and Improvements

Several repairs were made to the EDS and at customer buildings during the quarter. The items listed herein fall outside the scope of the DES Capital Projects. The remaining value

of the R&I budget at the end of the Fourth Quarter FY08 is \$356,621. Table 6 provides a summary of the FY08 expenditures and revenues associated with the R&I budget.

**Table 6. FY08 Repair and Improvement Expenditures and Balance**

Description	Date	Tracking #	Vendor	Expenditure	Transfer	Accruals & Adjustments	Market Value	Balance
<b>"Market Value" and "Cash Value" as of FY07</b>						\$ 4,207	\$ 277,853.63	\$ 276,840.02
DES632 Replace 6" Condensate Expansion Joint	08/15/07		CEPS	\$ 16,850.00				
DES642 MH-B2, B3, B4 and Expansion Joint Replacement	08/27/07		TEG	\$ 3,732.91				
DES661 Manhole B2,B3, B4, Expansion Joint Replacement and 4th Avenue Tunnel Vent for period of 8/5/07 - 9/1/07	09/11/07		TEG	\$ 4,667.57				
MH-B2, B3, B4 and Expansion Joint Replacement	10/15/2007	DES-681	TEG	\$ 5,333.39				
<b>Sub-Totals First Quarter FY08</b>				<b>\$ 30,583.87</b>	<b>\$ 0,372.51</b>	<b>\$ (30.92)</b>	<b>\$ 29,397.72</b>	<b>\$ 29,788.64</b>
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 9/30/07 - 11/3/07	11/17/07	DES-704	TEG	\$ 5,354.85				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 11/4/07 - 12/1/07	12/7/2007	DES-721	TEG	\$ 10,298.77				
NDES Emergency Steam Outage 10/20/07	12/21/2007	DES-737	CEPS	\$ 9,110.54				
MWS - Recovery cost for the DES Symphony Project	1/7/2008	DES-738	MWS	\$ 26,578.84				
MH-B2, B3, B4 and 4th Avenue Tunnel Vent Traffic Control 90 Peabody Street on 12/4/07 - 4:50 Hours to Music City Security	02/26/08	DES-775	CEPS	\$ 180.00				
<b>Sub-Totals Second Quarter FY08</b>				<b>\$ 55,942.32</b>	<b>\$ 0,372.51</b>	<b>\$ 175.00</b>	<b>\$ 4,005.22</b>	<b>\$ 44,201.9</b>
Repairs of damaged covers at Riverfront Park	01/31/08	DES-751	MPD	\$ 9,497.00				
Repairs to MH-18, MH-K, AA Birch, Gay Street, MH-10, 13, 23 and On-line steam leak repairs	01/28/08	DES-754	CEPS	\$ 3,454.60				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 12/30/07 - 2/2/08	02/15/08	DES-773	TEG	\$ 6,102.23				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 2/3/08 - 3/1/08 (February 2008)	03/07/08	DES-791	TEG	\$ 4,365.15				
Constellation Energy Source - Various Manholes, Renaissance Hotel, Ryman Aud., 7th Ave. Tunnel - various repairs	3/6/2008	DES-796	CEPS	\$ 11,268.64				
<b>Sub-Totals Third Quarter FY08</b>				<b>\$ 34,687.62</b>	<b>\$ 0,372.51</b>	<b>\$ 1.64</b>	<b>\$ 25,653.35</b>	<b>\$ 25,654.69</b>
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 3/2/08 - 3/29/08 (March 2008)	04/24/08	DES-814	TEG	\$ 6,007.83				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 3/30/08 - 5/3/08 (April 2008)	05/07/08	DES-831	TEG	\$ 829.68				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 5/4/08 - 5/31/08	06/10/08	DES-844	TEG	\$ 3,725.53				
Manhole B2,B3, B4, and 4th Avenue Tunnel Vent for period of 6/1/08 - 6/28/08	06/30/08	DES-860	TEG	\$ 1,601.38				
Various Manholes, Renaissance Hotel, Customer Meters, Ryman Auditorium, 7th Avenue Tunnel - various repairs	06/09/08	DES-854	CEPS	\$ 9,798.59				
Various repairs to manholes B3 and B4	06/30/08	DES-867	CEPS	\$ 16,647.37				
Various Manholes, Renaissance Hotel, Customer Meters, Ryman Auditorium, 7th Avenue Tunnel - various repairs	06/30/08	DES-868	CEPS	\$ 1,885.11				
<b>Sub-Totals Fourth Quarter FY08</b>				<b>\$ 40,495.49</b>	<b>\$ 0,372.51</b>	<b>\$ (305.72)</b>	<b>\$ 19,888.30</b>	<b>\$ 19,877.02</b>
<b>FY 08 Year to Date</b>				<b>\$ 161,709.30</b>	<b>\$ 241,490.04</b>	<b>\$ (526.25)</b>	<b>\$ 357,208.12</b>	<b>\$ 356,620.76</b>

## B. Preventive Maintenance

Preventive maintenance, tunnel and manhole inspections and reviews of customers' mechanical rooms were performed during the quarter. The principle items for discussion are presented.

- EDS Tunnel and Manhole Inspections:
  - Rock continues to be in need of repair in the ceilings in the tunnels under Broadway and 7<sup>th</sup> Avenues. The recommendations from the geotechnical consultant received during the Third Quarter were reviewed and the tunnel needs to be “mapped” as the initial stage of the design to make repairs. Once the “mapping” is complete, the repair work will be prioritized and scheduled for FY09.
  - Ladders were installed in MH 1 and D.
  - The condensate pump in MH 18 was repaired.
  - Several steam traps were replaced or repaired.
- State Tunnel Inspections:
  - As part of the capital project DES-047, eight 2" expansion joints, approximately 400 feet of 2" condensate piping and a 6" gate valve require replacement. This work is expected to be completed in the First Quarter FY09.
- The determination of the energy consumptions based on monthly bills for a number of customers required reviews of their meter installations. In each case, the meters were determined to be operating properly.
- Additional thermographic inspections of the EDS revealed other new “hot spots” near Manhole B and on Union Street between Capitol Boulevard and 7<sup>th</sup> Avenue.
- Other minor items are included in the CNDE monthly reports.

## C. Emergencies

CNDE did not report any emergencies with the EDS during the quarter.

## D. EDS Walk-through

TEG conducts a quarterly “walk-through” of the energy distribution system in order to help assess the overall condition of the system and also note specific areas that may require maintenance, repair or replacement. CNDE attempts to inspect all of the manholes on a monthly basis, and TEG has made arrangements to accompany CNDE during a portion of these manhole inspections once each quarter with the purpose to visit all manholes over the course of a year.

Some of the typical items which are noted during these inspections include: the presence of water in the vaults, any type of piping or piping component leaks (such as expansion joints, flanges, valves, traps, etc.), the condition of piping wall penetration seals, condition of insulation, condition of structural components, overall condition of the manhole and any other deficiency or safety related item which requires attention.

The walk-through for the Fourth Quarter was conducted on June 20 and June 24, 2008, by Jon Belcher, P.E.. The manholes visited included Manholes B2, C, C2, D2, D3, 5, 6, 10, 16, 16A, 25, S5, S6, the AA Birch tunnel, the 4<sup>th</sup> Avenue tunnel, the 7<sup>th</sup> Avenue Tunnel and the Broadway Tunnel. The following comments and observations are a result of these visits. CNDE is provided with a list of the vault issues, and remediation of these issues are to be addressed under the EDS maintenance program.

- Manhole B2
  - There was an appreciable amount of water this vault. Evidence shows that water levels have been as high as 3 to 4 feet.
  - Some minor corrosion exists on some components in this vault.
  - Some minor insulation degradation exists on the chilled water piping.
- Manhole C
  - This manhole was accessible for pictures from the street level, however access inside the manhole was not available because it is located within a construction zone for the new MTA bus depot.
  - This manhole is the last steel manhole on the system and is scheduled to be rebuilt in FY09.
  - There is very little insulation present in this manhole and it is extremely warm.
  - Corrosion exists on structural components.
- Manhole C2
  - This manhole is small and houses nonfunctional chilled water supply and return valves (isolation valves exist inside the John Sevier office building).
- Manhole D2
  - This vault is located at the west end of the AA Birch tunnel.
  - There is groundwater infiltration in this manhole that drains to a sump in the bottom of Manhole D3.
  - Some personnel safety related items need to be addressed in this manhole such as grating additions and ladder modifications.
- Manhole D3
  - This vault is located at the east end of the AA Birch tunnel.
  - There is groundwater infiltration in this manhole that drains to a sump in the bottom of the Manhole.
  - Some personnel safety related items need to be addressed in this manhole such as grating additions.

- Manhole 5
  - There was water present in this manhole and it required “pumping out”.
  - There was a minor steam leak on a steam slip joint.
  - There is some insulation requiring repair in this manhole.
  - The steel structural components in the vault have experienced substantial corrosion.
  - Some personnel safety related items need to be addressed in this manhole such as ladder extension.
- Manhole 6
  - There was water present in this manhole and it required “pumping out”.
  - The steel structural components in the vault have experienced substantial corrosion.
  - Some minor leftover construction debris exists and requires cleaning out.
  - The link seal on one of the steam penetrations needs to be re-installed and properly set.
  - There is a leak at a condensate piping flange.
  - There is some spalling of the vault’s concrete wall.
  - There is some insulation missing on the condensate sparge pipe
- Manhole 10
  - This manhole was extremely warm; there is a steam leak on a slip joint and the majority of the insulation is nonexistent.
  - Some of the piping penetrations do not appear to have link seals and a steam penetration appears to be too large for the piping.
  - The steel structural components in the vault have experienced substantial corrosion.
- Manhole 16
  - There is some minor corrosion on some chilled water piping support “tabs”.
  - Some personnel safety related items need to be addressed in this manhole such as grating additions.
- Manhole 16A
  - There was 2 to 3 feet of standing water in the vault due to groundwater infiltration.
  - This manhole has not been inspected on a monthly basis and should be.
- Manhole 23
  - There is still a minor amount of debris and construction material in this vault that needs to be cleaned out or removed.
  - There is some minor insulation degradation/damage in this manhole
  - The steel structural components in the vault have experienced some corrosion.
  - There does not appear to be a link seal at the steam/condensate service line penetration to the Sheraton Hotel. This should be investigated and appropriate repairs made, if required.

- Manhole 25
  - Some personnel safety related items need to be addressed in this manhole such as the addition of grating and/or handrails.
- Manhole S5
  - The upper portion of this vault is above ground and has several openings in the sidewalls presumably for ventilation for the vault. However, due to these openings, this vault has a large amount of leaves and debris and requires cleaning.
  - Some personnel safety related items need to be addressed in this manhole such as the installation of a ladder.
  - There is some degradation to the insulation in this vault.
  - It is not clear how the wall penetrations are sealed in this vault. Some of the penetrations are rectangular and therefore could not include linkseals.
- Manhole S6
  - There is no insulation in this manhole.
  - The steel structural components and piping in the vault have experienced substantial corrosion.
- 4<sup>th</sup> Avenue, 7<sup>th</sup> Avenue and Broadway Tunnel System
  - There is a minor amount of insulation either absent or in need of repair in the tunnels.
  - There is some significant rock spalling at various locations within the tunnels
  - There is a minor amount of debris in the tunnel system that should be cleaned out.
  - There is a guide immediately east of a steam line slip joint in the Broadway tunnel between 4<sup>th</sup> and 7<sup>th</sup> Avenue which the guide “hoop” is missing.
  - Due to groundwater infiltration and the slope of the tunnels, the southern ends of the 4<sup>th</sup> and 7<sup>th</sup> Avenue tunnels and all of the Broadway tunnel usually have water flowing on the floor.
  - Vertical shaft to the Sommet Center from the Broadway tunnel requires lighting repair/replacement.
  - Some personnel safety related items need to be addressed in the Sommet Center vertical shaft.
  - Vertical shaft to the Suntrust Bank service tunnel from the 7<sup>th</sup> Avenue tunnel requires lighting repair/replacement.
  - Some personnel safety related items need to be addressed in the Suntrust Bank vertical shaft.
  - There is some minor corrosion to structural members within the tunnel system.

## **VI. Customer Relations**

This section contains descriptions of the marketing efforts made by the DES Team during the quarter. The topics of interactions, meetings and training seminars with the customers are also discussed. There are currently 27 customers, comprised of 40 different buildings, connected to the EDS. Service to each of these buildings continues to prove satisfactory, and the responsiveness to customer issues is handled by CNDE in an excellent and professional manner.

### **A. Marketing**

- CEPS Sales and Development Manager met with the new owner of the 301 Realtor Building located at the north end of Gay Street. The Owner is interested in potentially using the NDES for his heating and cooling needs. A proposal is currently being developed for internal review and comments.
- A meeting was held in June with Tony Giarrantana with the Signature Tower to review the current status of this development.
- A meeting was also held in June with the Program Manager for the new Metro Convention Center to gather information regarding project timing and requirements.

### **B. Customer Interaction**

- Several customers were trained on the use of the DAQ software and the operation of their C-Tech metering panels.
- War Memorial requested that their chilled water return setpoint temperature be reduced due to an inability to cool their building. The temperature was reduced from 54°F to 50°F on April 7 and down to 48°F on June 5.
- Cordell Hull building reported no steam to their building on April 17. Further investigation by CNDE personnel revealed that a contractor, working for the state, had inadvertently turned off the main steam valve for the entire state steam system. This valve was opened, and service returned to all of the state steam customers.
- The representative for the state of Tennessee complained in April that the steam consumption for the TN Tower building was high. The CNDE Customer Service Representative (CSR) suggested that they review the internal operation of their building. Unusually high steam consumptions are typically indicative of internal problems and not issues related to DES.
- The State Capitol building requested a chilled water setpoint reduction in April. The CSR notified building personnel that an additional reduction in setpoint could not be made and that they should review the internal operation of their building.
- Metro personnel with the AA Birch building notified CNDE of a steam leak in their mechanical room. Upon further investigation by CNDE, it was determined that the steam leak originated from a pressure gauge on the building-side of the contractual line of demarcation. The building personnel repaired the leak.

- A mechanical failure on the building-side equipment at the Wildhorse on May 21 caused this customer to exceed their contract steam demand. No demand adjustments were made as a result of this mechanical failure.
- The chilled water return setpoint at the Viridian was changed from 56°F to 54°F on June 2 to assist in providing adequate cooling to this building. Due to issues with the building-side equipment, the setpoint was further reduced to 46°F on June 10 at the recommendation of TEG. TEG had been working closely with this customer during the Fourth Quarter to assist in the cooling of their building.
- The Criminal Justice Center installed new chilled water circulating pumps on June 10 and subsequently contacted CNDE regarding cooling problems. CNDE and TEG investigated the causes of these cooling problems and recommended that a three-way control valve located within the building be removed since it was providing re-circulation of a portion of the chilled water return. Work at this building by the owner to correct serious building-side equipment issues continued into the First Quarter FY09.
- The Metro Public Library reported cooling problems to CNDE. Further investigation by CNDE revealed a partially closed chilled water supply valve. This valve was opened.
- The Renaissance Hotel requested their chilled water return setpoint be changed back to its contract value of 49°F. This change was made by CNDE personnel on June 25.
- Other minor issues and customer interactions are noted in the monthly CNDE reports.

## **VII. Recommendations**

Based on the review of the Fourth Quarter EGF and EDS operations, the following recommendations are made.

- As mentioned in previous reports, further investigation is recommended regarding the addition of automated O<sub>2</sub>-trim to the boilers. This increase in automation may increase the fuel efficiency of the boilers and may have a relatively short return on investment. TEG will begin the investigation of the economic benefit related to this modification during the fiscal year. Only the customers receive the economic benefit for this investment, thus funding for such projects should be the responsibility of the customers.
- Due to the apparent soil erosion on the west face of the EGF, CNDE should determine if the terrain on the west side of the EGF needs regrading to prevent rainwater from flowing into and under the foundation wall. These repairs could help prevent further settling of the foundation and soil erosion. No action is required at this time.
- Painting of structural steel within manholes to reduce or eliminate corrosion needs to begin as an ongoing maintenance item.

- Insulation which is either not present or in disrepair within the manholes needs to be addressed through either capital projects, which include work within these manholes, or through DES 050.
- Potential safety hazards within some of the manholes and tunnel shafts need to be addressed.
- CNDE should continue to remove any debris present in the manholes as inspections and schedules allow.